



**NOAA Teacher at Sea  
H. Turtle Haste  
Onboard NOAA Ship McARTHUR II  
June 4 – 9, 2007**

**NOAA Teacher at Sea: Turtle Haste**

NOAA Ship MCARTHUR II

Mission: Ecosystem Survey and Seafloor Recovery Evaluation in the Central California National Marine Sanctuaries, Leg 1 - CalCOF1 Survey

Day 2: June 4, 2007

**Weather Data from Bridge**

Visibility: 0 – fog

Cloud Cover: 100 %

Wind Direction: 280 - degrees

Wind Speed: 9 knots

Sea Wave Height: 1 foot in AM, 2 foot in PM

Swell Height: AM swells of 2-3 feet, PM mixed swells of 4-6 feet

Surface Water Temperature: 14.15 – degrees Celsius

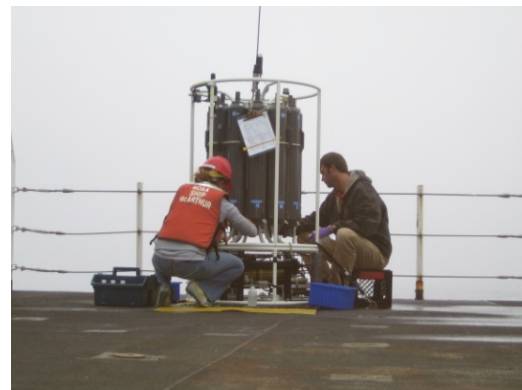
Air Temperature: 14.16 – degrees Celsius

Sea Level Pressure: 1017.15 millibars

**Science and Technology Log**

Established survey lines on this cruise have been monitored by the Monterey Bay Aquarium Research Institute or MBARI, since the early 1990 by collecting the same biological and chemical data. I was referred to <http://www-mlrg.ucsd.edu/data/data.html> for more details and the overview of the survey. Our particular survey lines begins outside of the Golden Gate Bridge, traveling westward for a while, then we will perform a cast of 4500 meters then travel south to for another 4500 meter cast and turn East to finish the survey line near Monterey Bay. The survey lines are numbered in a particular pattern that will be used to identify all samples from each station. At some points we will be beyond the Territorial Seas of the United States, but within the Exclusive Economic Zone.

What is collected at each station: A CTD measures specific properties of seawater including salinity, temperature and fluorescence as it is lowered off the stern of the ship. The CTD descends under the supervision of the CTD technician, crane operator and assisting crew member to the prescribed depth while generating real-time data in graph form through the descent. Once at depth, the technician is in radio



**Charlotte Hill and Erich Rienecker collect water samples from a CTD cast.**

contact with the crane operator who raises the CTD to prescribed depths where bottles are tripped to collect water samples at stated intervals. Generally the prescribed depth is 1000 meters with exceptions at the near shore stations where the depth is less than 1000 meters. Other data is collected from HyperPro Optical sensor casts, made at midday stations and Secchi disk casts made at all daytime stations following CTD casts. Oblique bongo net tows for zooplankton are made after the CTD casts at a depth of 200 meters. As the water is collected, several chemical tests are performed, including dissolved oxygen and



**Kit Clark and Troy Benbow demonstrate the bowline to NOAA Teacher at Sea Elsa Stuber.**

nutrients. Dissolved oxygen is tested from each cast using a set of chemicals that is very similar to ones I have used in fresh water chemical analysis as well as nutrients to assess the changes in sediment load. Phytoplankton samples are collected for processing and

culturing. In addition, a surface observer is stationed on the flying bridge to document all marine mammals and birds that are encountered. There is an interest in cetaceans, specifically beaked whales.

**Personal Log**

I found a ship’s billet on my door to tell me where to muster for fire, man overboard, and abandon ship. I made sure to visit all the locations to ensure that I knew where to go. The “plan of the day” is posted in convenient locations by ship’s personnel and is required reading in order to know what activities and meetings, are planned. I was able to try on my “gumby”



**Marguerite Blum models under the Bay Bridge while loading science gear.**

suit and heavy PFD. I identified what is now called the “Leedo Deck” reminiscent of the television show *Love Boat* where science team members have placed a few lawn chairs for relaxing on aft section of deck one, near the phytoplankton incubation trays.



**Dr. Kurt Collins listening to the ball game on the “Leedo deck” off watch.**

As we depart San Francisco, we will sail out of the Golden Gate, under the Golden Gate Bridge. Although I had hoped for clear weather for the trip under the bridge, it was foggy.

**Question of the Day**

How does the collection and evaluation of phytoplankton assist with monitoring oceanic primary production and our understanding of the role the ocean plays as a global carbon sink?

I need to read more about the total project and perform more interviews of the cooperating scientists to better answer this.

### **Addendum : Glossary of Terms**

An overall map of all the stations is at



**Erich Rienecker sets up the filter system to process phytoplankton from the CTD casts.**

[http://www.calcofi.org/newhome/publications/CalCOFI\\_Reports/v47/Vol\\_47\\_Station\\_Plan.pdf](http://www.calcofi.org/newhome/publications/CalCOFI_Reports/v47/Vol_47_Station_Plan.pdf)



**NOAA Teacher at Sea Elsa Stuber prepares the seawater phytoplankton incubation trays.**

Exclusive Economic Zone – extends for 200 nautical miles (370 km) beyond the baselines of the territorial sea.

Territorial Waters or sea- an area of coastal waters that extends at most twelve nautical miles from the mean low water mark of a littoral state that is regarded as the sovereign territory of the state.

Nautical Mile – is 1852 meters.

CTD – A CTD recorder, which stands for Conductivity-Temperature-Depth recorder, measures salinity, the amount of seawater conductivity in practical salinity

units. It also measures pressure recorded in decibars. Since depth and pressure are directly related, a measurement in decibars can be converted to depth in meters. Temperature is measured as well and other sensors may be placed on the device as well. The one used had an altimeter to compare to the ship's depth sounder and deployed cable for an accurate measure of the depth of the device.

HyperPro Optical sensor – measures light refraction at different wavelengths through the water column as compared to the surface measurement. This device is lowered by hand to a set depth. It is a hyperspectral radiometer, recording optical data in the wavelength region between 350 and 800 nanometers.

Oblique bongo net – a set of rings (thus the name bongo as it looks like a bongo drum) designed for oblique plankton tows. The rings are connected to nets which cone into two catch devices at the ends. Bongos are towed at 200 meters, devised by allowing 300 meters of cable out and towing it at an angle of 45-degrees. Adjustments in cable length are made depending on the angle reached.

Secchi disk - is used to measure how deep a person can see into the water. It is lowered into the ocean by unwinding the waterproof tape to which it is attached and until the observer loses sight of it. The disk is then raised until it reappears. The depth of the water where the disk vanishes and reappears is the Secchi disk reading. The depth level reading on the tape at the surface level of the ocean is recorded to the nearest foot.

Sea Level Pressure (from Wikipedia) Also referred to as *Mean sea level pressure (MSLP or QFF)* is the pressure at sea level or (when measured at a given elevation on land) the station pressure reduced to sea level assuming an isothermal layer at the station temperature. This is the pressure normally given in weather reports on radio, television, and newspapers or on the Internet. When barometers in the home are set to match the local weather reports, they measure pressure reduced to sea level, not the actual local atmospheric pressure. Average sea-level pressure is 101.325 kPa (mbar) or 29.921 inches of mercury (inHg).

Visibility – how far in front, or around the ship one can see. In this case, using the marine mammal observer's scale, based on nautical miles.

Wind Direction- Which direction the wind is blowing FROM. 0 is north, 180 is south, 270 is west. This may also be recorded using the abbreviation of the direction in capital letters.

Sea Wave Height and Swell Height – estimates (based on an average of waves passing under buoys) the height of a wave (from crest to trough) of individual waves and larger waves.

Dissolved oxygen- the amount of oxygen that is available in the water for organisms to use for ventilation, typically referred to in parts per million, or ppm.

Phytoplankton - (from Wikipedia) *are the autotrophic component of the plankton that drift in the water column. The name comes from the Greek terms, phyton or "plant" and πλαγκτος ("planktos"), meaning "wanderer" or "drifter". Most phytoplankton are too small to be individually seen with the unaided eye. However, when present in high enough numbers, they may appear as a green discoloration of the water due to the presence of chlorophyll within their cells (although the actual color may vary with the species of phytoplankton present due to varying levels of chlorophyll or the presence of accessory pigments such as phycobiliproteins).*

Zooplankton - (from Wikipedia) *are the heterotrophic (or detritivorous) component of the plankton that drift in the water column of oceans, seas, and bodies of fresh water. The name is derived from the Greek terms, ζῷον ("zoon") meaning "animal", and πλαγκτος ("planktos") meaning "wanderer" or "drifter"<sup>[1]</sup>. Many zooplankton are too small to be individually seen with the unaided eye. Zooplankton is a broad categorisation spanning a range of organism sizes that includes both small protozoans and large metazoans. It includes holoplanktonic organisms whose complete life cycle lies within the plankton, and meroplanktonic organisms that spend part of their life cycle in the plankton before graduating to either the nekton or a sessile, benthic existence. Through their consumption and processing of phytoplankton (and other food sources), zooplankton play an important role in aquatic food webs, both as a resource for consumers on higher trophic levels and as a conduit for packaging the organic material in the biological pump.*

Gumby Suit - big, plastic, orange suits that are designed to protect a person from the cold water. Made of a material similar to what scuba divers wear. The suit is thicker, more buoyant and designed to remain dry inside. Suits are very bulky and are supposed to cover the entire body except the face.

PFD – personal floatation device, lifejacket, or “puff-duh”

Flying Bridge – located on the very top and most forward deck of the ship. On the MCARTHUR II, the flying bridge is above, or on top of the bridge. All ship personnel and crew when engaging in science activities keep in contact through the bridge with radios. Radio protocol requires the location being called to be stated first, followed by the calling location. For example, ” bridge, flying bridge”

If one is calling the bridge from the flying bridge.

Plan of the Day – is posted throughout the ship in common locations. This bulletin informs both crew and science personnel as to ship activities, wave height and safety issues.

NOAA Ship McArthur II  
Plan of the Day (POD)  
Mission: M2-07-04  
MON 04JUN07

Planning Factors: Sunrise: 0549    Sunset: 2025

	Wind	Seas	Precipitation
AM	SW 10 kts	Waves <1ft, W Swell 2-3ft	Patchy fog
PM	NW 5-15 kts	Waves 2ft, Mixed Swell 4-6ft, 11 sec Secondary S Swell 2-3ft, 11 sec	Same

Major Activities:  
 0730 Liberty Expires  
 ~0830 CTD Test Cast, aft deck  
 0900 Welcome Aboard Meeting, Dry Lab  
 ~0930 Gangway aboard ship  
 1000 U/W on M2-07-04  
 ~1415 Drills

NOTES:  
 1. **Operational Notes:** Underway on CALCOFI survey. Ship will proceed offshore along CalCOFI occupying stations each 10-20 NM to ~175 NM offshore. We will then proceed, still occupying stations each 20 NM, NE to station 67-90 at the offshore terminus of Line 67, and work back in shore with 20 NM. CTD casts to 1000m will be made at all stations depth permitting, except for stations 60-90 at 4000m casts will be made. Secchi disk casts will also be made (by hand) at daytime stations, during

**Plan of the Day for NOAA ship MCARTHUR II.**